# Commercial Space Transportation Experimental Permit

**Experimental Permit Number: EP 11-006**

**Blue Origin, LLC**

**is authorized, subject to the provisions of 51 USC Subtitle V, ch. 509, and the orders, rules, and regulations issued under it, to conduct launches.**

General. The permittee is authorized to conduct:

(1) An unlimited number of flights of Propulsion Module 2 within the operating area identified by permit order A; and

(2) Pre-flight and post flight ground operations at West Texas Launch Site associated with flights of Propulsion Module 2.

**This permit is granted subject to the terms, conditions, and limitations set forth in permit orders A and B, and any subsequent orders issued by the Office of Commercial Space Transportation.**

**The permittee shall at all times conduct its operations in accordance with the regulations prescribed by the Office of Commercial Space Transportation for the activities authorized by this experimental permit.**

US Department
of Transportation
**Federal Aviation Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

**Issued On: April 29, 2011**

**Effective On: April 29, 2011**

Kenneth Wong

**Manager, Licensing & Evaluation Division**

**Experimental Permit Order No. EP 11-006A (REV 1)**

OFFICE OF COMMERCIAL SPACE TRANSPORTATION
EXPERIMENTAL PERMIT ORDER REGARDING

**REUSABLE SUBORBITAL ROCKET LAUNCHES**

AUTHORIZED BY EXPERIMENTAL PERMIT NO. EP 11-006
ISSUED TO

BLUE ORIGIN, LLC

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1. Authority: This Order is issued to Blue Origin, LLC (Blue Origin) under 51 U.S.C. Subtitle V, Chapter 509 and 14 C.F.R Ch. III.

2. Purpose: This Order modifies Experimental Permit No. EP 11-006 (the Permit) issued on April 29, 2011, by the Federal Aviation Administration's Office of Commercial Space Transportation (Office), authorizing Blue Origin to conduct reusable suborbital rocket launches of a Propulsion Module 2 (PM2) launch vehicle. This Order prescribes definitions and conditions applicable to each launch conducted by Blue Origin under the Permit.

3. Definitions: For purposes of the permit and any orders issued by the Office modifying the Permit, the following definitions apply:

   (a) "Operating Area" means a three-dimensional circular region with a radius of 7 miles centered on Blue Origin's North Landing Pad at 31.4517° North latitude and 104.7628° West longitude.

   (b) "Post-flight ground operations" begin with the landing of PM2 and end with the safing of the vehicle. Post-flight ground operations include, but are not limited to, depressurization and venting of hazardous materials from the vehicle.

   (c) "Pre-flight ground operations" begin with pressurization of helium and nitrogen bottles in Blue Origin's vehicle processing facility.

4. Safety Clear Zone:

   (a) During pressurization of helium and nitrogen bottles, Blue Origin must establish a safety clear zone 40 feet outside of the north wall and 20 feet outside of all other walls of the vehicle processing facility.

   (b) During propellant loading of PM2, Blue Origin must establish a safety clear zone with an 8,990 feet radius from the launch point at 31.423° North latitude, 104.757° West longitude (WGS84 datum).

   (c) During post-flight ground operations, Blue Origin must establish a safety clear zone with a 5,280 feet radius from the launch point identified by paragraph (b) of this section.

5. Allowable Design Changes: In accordance with 14 C.F.R § 437.85(a), Blue Origin may make the following design changes to PM2 without invalidating the Permit provided that Blue Origin does not alter its demonstration of compliance with 14 C.F.R §§ 437.55, 437.57, 437.59, and 437.61. Blue Origin may:

   (1) Pressurant-Storage Bottles: Substitute lighter bottles of the same capacity.
   (2) Batteries: Upgrade batteries with higher energy density to lower the battery mass.
   (3) Antenna System: Move the location of the GPS antennas.
   (4) Electrohydraulic Drive Unit (EHDU): Upgrade the EHDU to accommodate commercially-available electronic components and a wider range of supply voltages.
   (5) Hydraulics: Reduce the size of some hydraulic system components to save weight.
   (6) Thrust Chamber Assembly (TCA): Weld instead of bolt the TCA to minimize weight.
   (7) Engine Efficiency: Modify the engine injectors and thrust chamber, to increase the total vacuum thrust to 35,000 lbf per engine and the vacuum specific impulse to 252 seconds.
   (8) Fin Control: Add software allowing the Flight Manger software to actuate the fins during ascent (in addition to engine gimballing) to enhance control of PM2.

(9) Thrust Termination System (TTS) Software: Make changes to Blue Origin's Flight Manager and TTS software to decrease the maximum potential horizontal range of the vehicle.

(10) 3-Engine configuration: Launch PM2 with three engines as part of its incremental flight program.

6. Other Requirements: During permitted operations, Blue Origin must ensure that no invited guests are within the operating area.

7. Permit Term: The term of the permit is one year from April 29, 2011, the effective date of the permit.

OFFICE OF COMMERCIAL SPACE TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

By: Kenneth Wong

Kenneth Wong, Manager
Licensing & Evaluation Division

Issued: May 20, 2011

Effective: May 20, 2011

**Revision History:**

Original Permit Order - Issued April 29, 2011

Revision 1 - Issued May 20, 2011

1) Revise paragraph 5(7) to replace 30,500 lbf with 35,000 lbf.

2) Revise paragraph 5(7) to specify vacuum thrust and vacuum specific impulse.

3) Added effective date of permit, April 29, 2011, to paragraphs 2 and 7 for clarity.

OFFICE OF COMMERCIAL SPACE TRANSPORTATION
EXPERIMENTAL PERMIT ORDER REGARDING

**FINANCIAL RESPONSIBILITY REQUIREMENTS**

AUTHORIZED BY EXPERIMENTAL PERMIT NO. EP 11-006
ISSUED TO

BLUE ORIGIN, LLC

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1. Authority: This Order is issued to Blue Origin, LLC (Blue Origin) under 51 U.S.C. Subtitle V, Chapter 509 and 14 C.F.R. Ch. III.

2. Purpose: This Order modifies Experimental Permit No. EP 11-006 (the Permit) issued concurrently by the Federal Aviation Administration's Office of Commercial Space Transportation (Office), authorizing Blue Origin to conduct reusable suborbital rocket launches of Propulsion Module 2 (PM2). This Order prescribes financial responsibility requirements for permitted activities of Blue Origin.

   Liability Insurance: Blue Origin must maintain a policy or policies of liability insurance (or otherwise demonstrate financial responsibility) in accordance with 14 C.F.R. § 440.9(b) in the amount of Three Million Dollars ($3,000,000) for covered claims resulting from permitted activities performed at West Texas Launch Site as described in Experimental Permit Order No. EP 11-006A for each launch of PM2.

3. Time Periods for Demonstrating Compliance:

   (a) Financial Responsibility: In accordance with 14 C.F.R. § 440.15(a), Blue Origin must submit evidence of insurance and the required certifications at least 48 hours prior to the first launch of PM2.

(b) Waivers of Claims: Blue Origin must submit the reciprocal waiver of claims agreement required by 14 C.F.R. § 440.15 and 440.17, signed by Blue Origin, at least 48 hours prior to the first launch of PM2.

OFFICE OF COMMERCIAL SPACE TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

By: Kenneth Wong
Kenneth Wong, Manager
Licensing & Evaluation Division

Issued: April 29, 2011

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